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West Europe Report

SCIENCE AND TECHNOLOGY

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12 February 1986

WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

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AEROSPACE

SPD OF FRG URGES HERMES PARTICIPATION

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 18 Jan 86 p 2

[Text] The SPD Bundestag fraction has called upon the FRG Government to allow German participation in the Hermes space vehicle planned by Paris. A year ago the FRG Government had committed itself to not beginning any other aerospace projects other than participating in the further development of the European "Ariane" rocket and in the American manned space station "Columbus." The representative for research policy of the SPD fraction, Vosen, criticized this decision as a "fundamental" mistake because in doing so the FRG was excluding itself from an independent European manned space flight. Vosen called on the FRG Government to end the argument between Research Minister Riesenhuber and Foreign Minister Genscher over Hermes and to prepare a decision on the project in the technology committee.

Vosen suspects a tactical game behind Riesenhuber's "stalling resistance" to Hermes. In his opinion, Riesenhuber is not following Genscher's push for German participation because he is apprehensive about further strains on his research budget. Vosen even shares Riesenhuber's view that no resources are available in the research budget for Hermes. According to Vosen, Riesenhuber has overspent himself. But Hermes cannot fail due to lack of money. Vosen, however, did not want to accept Riesenhuber's argument that Hermes will not yield anything new because it is not a new technology. Vosen says the FRG would benefit greatly from participation in this project. These benefits lie in developing new materials and energy sources, additional discoveries in the fields of aerodynamics and thermal engineering, in building "artificial intelligence" (robotics) and in researching life support systems.

/9365

CSO: 3698/239

AEROSPACE

BRIEFS

FOKKER 50 FLIGHT TESTED--Amsterdam, December 30--Dutch aircraft builder NV Fokker said that a prototype of its new Fokker 50 propjet successfully completed its first test flight on Saturday. The two-hour flight was the first step in an extensive test program for a certificate of airworthiness from the Dutch Government Aviation Service (RLD). Fokker expects to get the certificate in December 1986, but before then two F-50 prototypes must complete 650 hours of test-flying and the production model must test-fly a further 75 hours. The F-50 is a 50-seater short-haul passenger airliner powered by two Pratt and Whitney PW 124 turboprop motors. It is the successor to Fokker's F-27 Friendship. The Dutch company has already sold 38 F-50's and options have been placed on a further 12. The first delivery is scheduled for the second half of 1986. Fokker's other new aircraft, the 110-seater F-100 fanjet is due to begin flight testing in the spring of 1986. Sales now stand at 38 and options have been taken on another 31. [Text] [The Hague ANP NEWS BULLETIN in English 30 Dec 85 p 2] /9365

CSO: 3698/239

BIOTECHNOLOGY

BELGIUM'S IRE-MEDGENIX DEVELOPING NEW PRODUCTS

Brussels INDUSTRIE MAGAZINE in French Jul-Aug 85 pp 48-49

[Article by C. Calinesco: "IRE-MEDGENIX: A Noteworthy Cooperation"; first paragraph is INDUSTRIE MAGAZINE introduction]

[Text] Pushed by the cabinet of Melchior Wathelet, Wallonia has resolutely taken the plunge into biotechnology. Following Hybritech and Celltarg, IRE-Medgenix is entering this field which is as risky as it is promising.

The National Institute of Radio Elements (IRE) has in fact formed a subsidiary combining its efforts and means with those of the American company Bioassay Systems Corp. (BSC).

IRE's state-approved establishment at Fleurus has the distinction of being both a research center and an industrial partnership, directed by the firm hand of Dr Rene Constant, general manager.

BSC is the flagship of a group of three other American enterprises: American Biogenics, Bioassay Systems Corp. Research, and Genus Diagnostics. In its specialty, it is in fact one of the three largest in the United States, approved by the Food and Drug Administration.

Originally, BSC was a toxicology referral center at Woburn, near Boston, but its activities diversified with the absorption of the Toxigenics company of Decatur, Illinois. Since then, BSC has marketed a line of diagnostic products based on cellular culture technology.

These products have allowed BSC to experience stunning expansion. Its turnover should go from \$4 million in 1984 to \$14 million in 1985, and its total work force in the United States (187 people) has doubled in 1 year.

The new company, with a capital of 200 million Belgian francs, is called IRE-Medgenix. Besides IRE and BSC, its shareholders are--as in the case of Celltarg--the affiliated holding companies of SRIW [Regional Society of Walloon Investments]: CDA and CDB. The new operation--which grew out of a systematic study by IRE into the possibilities for transatlantic joint

ventures--enjoys the support of Melchior Wathelet, minister of new technologies for the Walloon area, who has listed IRE on the honor roll of his Athena Operation.

A first consequence of the creation of IRE-Medgenix is that from now on IRE will be marketing BSC's current product line in Europe, Africa, and the Middle East.

This is essentially a matter of promoting a new family of instruments and systems for identifying viruses and bacteria difficult to detect by conventional methods: gentubes-gencells.

These products are said to allow detection within a period of from 24 to 72 hours, compared to several weeks with the best present techniques.

A second consequence of the agreement concluded in February: BSC has committed itself to setting up a high-level scientific toxicology center in the Walloon area within the next 18 months.

A third consequence: the probable creation of a new generation of products.

Technological Accomplishments

Up until now, IRE has specialized in production of instruments used for in-vitro biomedical analysis and particularly in the area of radioimmunology. Its products are sold worldwide, through a large network of subsidiary sales companies.

The radioimmunology technique makes it possible to determine the quantity of antigens present in human blood serum. With its use, quantities on the order of picograms per milliliter can be measured. The basis of radioimmunology analysis is the competition between an antigen marked with a radioactive isotope and an unmarked antigen for specific antibodies. The advantages of this method reside in its precision, put to good use by IRE particularly for analysis of endocrinal hormones related to reproduction, of endocrinal hormones of the pancreas, and of hormones intervening in the phosphocalcic mechanism.

But this technique has its limitations because it requires rather long reaction times and also because the polyclonal antibodies used are often available only in rather limited quantities.

However, the technique of immunoradiometric assays, more recently perfected by IRE, uses monoclonal antibodies marked with iodine 125. Unlike polyclonal antibodies, they can be produced in practically unlimited quantities and give faster results with increased sensitivity and specificity. Applying this technique, IRE was able, last December, to begin marketing the first radioimmunoassay instrument for analysis of transcortin (corticosteroid binding globulin) allowing the measurement of free cortisol concentration in the blood.

New Developments

New industrial developments can be expected soon. Gencells and gentubes produced by IRE will be commercially available by the end of this year.

The term gencells covers a complete family of all the cellular lineages routinely used for culture of various microorganisms (viruses, mycoplasmas, chlamydia, etc.). Thanks to a process which IRE classifies as "special" (meaning secret), these gencells benefit from prolonged usefulness which allows their distribution and use in gentubes, a patented system that simplifies their manipulation and allows large savings for the user.

But, although gentubes and gencells are already an industrial reality in the United States, further developments presuppose an effort of research or at least of refinement.

This is the case for the use of nonisotopic markers: Monoclonal antibodies can possibly be marked by tracers such as enzymes or luminescent or fluorescent substances instead of radioactive ones. The IRE laboratories claim to have perfected this technique also. Conversion to the production phase is all that remains to be done. With these nonisotopic markers, they hope to obtain results equivalent to those obtained now with radioactive markers. IRE will use this technique for analysis of hormones related to reproduction and of tumorous antigens.

Last but not least, within the next 3 years, IRE-Medgenix is to develop a large research program to improve the present gentubes and gencells. The research program (300 million Belgian francs, 50-percent financed by the Walloon region, which will recover its investment only if the project is successful) will particularly focus on endocrinology and diabetology. It is primarily a matter of perfecting a reliable and simple diagnostic material to permit diabetics to monitor their own sugar balance at regular intervals. They also hope to perfect a quick system of immunodiagnosis by small stems of the bacteriuria, i.e., allowing analysis of bacteria in the urine.

In the view of IRE management, all of this positions the Institute to set up a European-level diagnostic pool.

[Box, p 48]

The IRE-Medgenix Partners

-Bioassay SC is one of America's major companies in the high-tech field of toxicology. At the end of 1984, it employed 155 people and registered a turnover of 250 million Belgian francs and significant profits.

The prospects for 1985 are a turnover of 1 billion Belgian francs and increased profits.

The U.S. company is one of six toxicology centers approved by the American government.

-IRE, the Walloon scientific and industrial partner, is both a business and a public research center employing 300 people, mostly in the field of diagnostic instruments.

-CDA and CDB, financial partners, are the two biotechnical holding companies of the Walloon area.

Established in 1982, with 800 million Belgian francs from the FRI (Industrial Modernization Fund), on the initiative of Melchior Wathelet, CDA and CDB are charged with facilitating financing of industrial projects of high technological value.

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CSO: 3698/1037-A

BIOTECHNOLOGY

FRENCH-JAPANESE BIOTECH COOPERATION PROJECT PROPOSED

Puteaux BIOFUTUR in French Oct 85 pp 4-5

[Text] This year biotechnology was one of the three main topics at the recent Tokyo symposium on state of the art technology. On the occasion of this symposium Mr Thomas, director of the "Biotechnology Development" program at the Ministry of Research and Technology, developed a proposal for Franco-Japanese cooperation which was received with a great deal of interest.

It involves the creation of a biotechnology laboratory in Japan, probably in Tsukuba or in the Kyoto-Osaka area. This laboratory will be jointly operated by 6 to 12 French and Japanese firms, financed and managed by the governing bodies concerned (MRE, MRT, and MRICE on the one hand, and MITI and AST on the other hand).

The primary purpose of this project is the training of twenty French and Japanese researchers and engineers. This research, focused on enzyme technology and the molecular biology of proteins, includes contributions from computer science and electronics to these disciplines, in a resolutely noncompetitive atmosphere where freedom of publication is guaranteed.

It involves a genuine "platform for exchange" which would allow France to better understand and gauge the developments in Japanese research. Japan views this project as an alternative to an overly-exclusive association with the United States.

In response to this favorable alliance, the rapid formation of a study group uniting French and Japanese firms will take place shortly, and some concrete proposals concerning legal status (for example, a nonprofit organization) and financing will be published. Within the framework of the France-Europe-Japan report drafted by the Ministry of Industry, this project was recommended by the "Bioindustry" sector group (president: J.P. Raynaud, Director of Innovation, Roussel-Uclaf).

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BIOTECHNOLOGY

CHIEF OF SWEDEN'S FERMENTA ON COMPANY STRATEGY

Helsingborg BIOTEKNIK & BIOKEMI in Swedish Nov 85 pp 6-9

[Article by Lars Lundgren: "Fermenta's Managing Director, Refaat El-Sayed: 'Biotechnology Is a Veritable "Soup" if You Don't Know What You Want to Do'"]

[Excerpts] "The processes are the alpha and omega of biotechnology. It is a matter of producing something. And making a profit from it."

These are the words of Refaat El-Sayed, managing director and majority owner of successful Fermenta.

Biotechnology and gene technology are like any other technology. If you do not have a clear idea of how to utilize it, biotechnology is a veritable "soup," he says.

Rapid Development

In a short time Fermenta has established a position as the dominating manufacturer of antibiotics. In 3 years the company has developed from having manufactured a few bulk products into also producing intermediate products and active substances for pharmaceutical use. The number of products have grown from "not quite two" when Refaat El-Sayed took over to more than 150 today, many of them highly specialized.

Even so, this is still barely halfway in Refaat El-Sayed's first five-step plan, the strategy he has followed since taking over Fermenta from Astra in 1982. He acquired the ideas for it during many years as a consultant for other biotech companies and as the principal force behind the company Micro-Chem Development in Stockholm.

"When I bought Fermenta, many disdainfully thought that it involved only traditional processes. People have such small perspectives; many times they see things so short-sightedly."

"When I took over the company it had a unique knowledge of the process, a unique processing technique. But perhaps it didn't have the extra spice needed to utilize this knowledge."

"I knew that it was a good business, a good platform to build on--if you had good ideas."

"It's like building a house. First you get the land, perhaps with an old shack. You tear that down and build a new house. But if you have the land, then you have something to start with. Even from the beginning Fermenta had much of that which many other biotech companies lack."

"I had worked a lot with other major companies. I knew which way I wanted to grow."

Strategy

Fermenta's company strategy--as it has been formulated by Refaat El-Sayed--includes five steps.

--Expand by buying up companies with free production capacity in the field of antibiotics for pharmaceutical use.

--Integrate fermentation and organic synthesis.

--Develop new technology in order to improve the production processes and increase profits.

--Invest in new areas of business, primarily fodder and veterinary medicine.

--Integrate forward in the manufacturing chain.

Up to now this seems to have proceeded easily. Fermenta buys a suitable company, a company which either has the production capacity for fermentation or a facility for organic synthesis. The old owners are induced to sign a long-term contract with Fermenta, which in that manner obtains a secure buyer for the base production. Fermenta's own knowledge is used to improve the processes and increase profits.

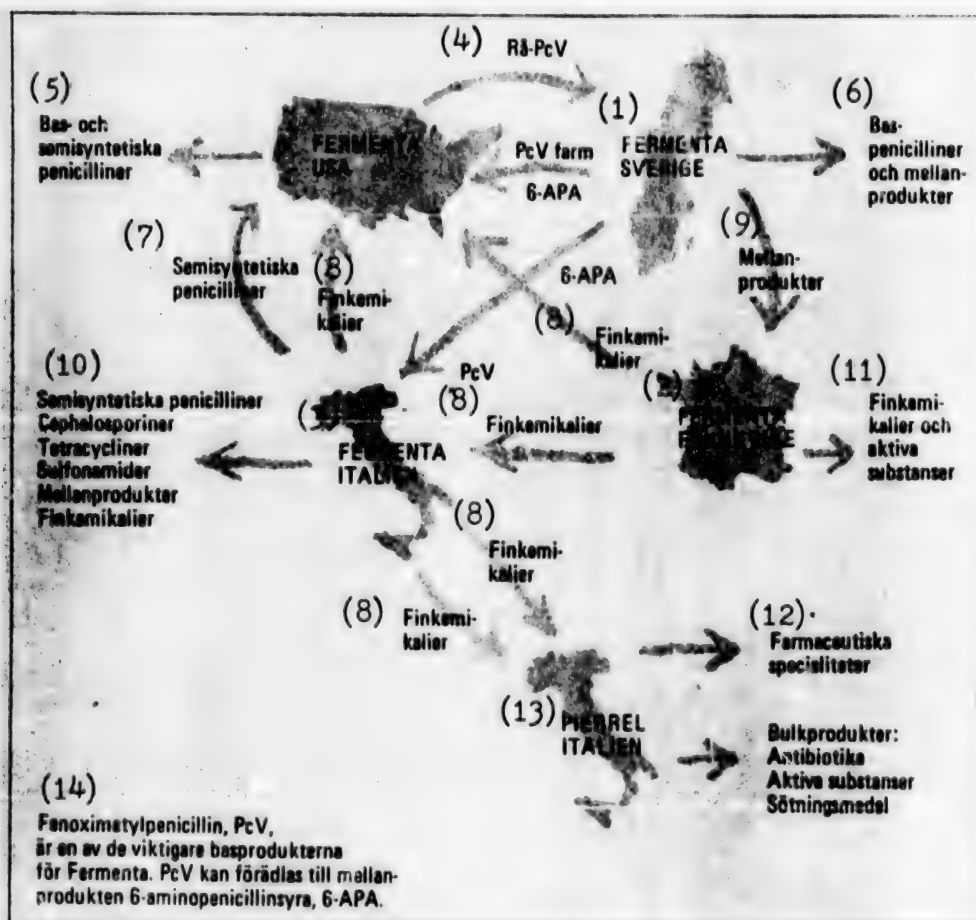
By combining biotechnical production processes with organic synthesis within the group, the former base products are further refined into intermediate products and active substances. The integration provides a secure market for the products, prices are stabilized and by going further in the degree of refinement the profit margins increase.

No Bulk Manufacturer

Today Fermenta is no longer a bulk manufacturer.

"We sell only 15 percent of the production as base penicillin. The rest goes on to further refinement within the group."

Will the next step for Fermenta be to further refine its products all the way into finished medicines?



In a few years Fermenta has developed from being a manufacturer of a few bulk products in Strangnäs into a conglomerate with subsidiaries and facilities in several countries. More intermediate products and active substances are now featured.

- Key:
1. Fermenta Sweden
 2. Fermenta France
 3. Fermenta Italy
 4. Raw PcV
 5. Base and synthetic penicillins
 6. Base penicillins and intermediate products
 7. Semisynthetic penicillins
 8. Fine chemicals
 9. Intermediate products
 10. Semisynthetic penicillins, Cephalosporins, Tetracyclines, Sulfonamides, intermediate products, fine chemicals
 11. Fine chemicals and active substances
 12. Pharmaceutical specialties. Bulk products: antibiotics, active substances, sweeteners.
 13. Pierrel, Italy
 14. Phenoximethylpenicillin, PcV, is one of the more important base products for Fermenta. PcV can be refined into the intermediate product 6-aminopenicillin acid, 6-APA.

"No it is enough to have active substances for the pharmaceutical industry. Our foot in the industry is Pierrel in Italy, one of the world's 10 largest pharmaceutical companies. Italy is the fourth largest market in the world for use of pharmaceutical products," says Refaat El-Sayed.

"When we are finished integrating on the pharmaceutical side, we will continue with products for veterinary medicine and integrate in the same way."

"Veterinary medicine is a really large market," says Refaat El-Sayed enthusiastically. "A lot will happen there. It is approximately a 5-billion dollar market!"

Refaat El-Sayed sees no risks in Fermenta's rapid expansion.

"Growth at Fermenta does not take place in the same way as before. We grow by integrating. It is like a puzzle: The more pieces are in the right place, the easier it is to see the whole, what the picture shows."

"Each unit within Fermenta is independent and has its own management resources. That is where the greatest knowledge must be. We decentralize the operational decisions. Strategy is handled centrally."

"Since we base the expansion on marketing, it is also the market which 'tells us' what is needed, where the opportunities are. The scientific knowledge is intended to be a 'backup.'"

How long can Fermenta continue to expand?

"As long as the business idea permits. We still have a need for more capacity. Today we manufacture two-thirds of the base products we need. Thus, we have a need for 50 percent more production capacity. The alternative is to increase the yield from existing processes by the same amount."

Fermenta is now coming out with a preparation against pneumonia in young pigs. It is an antibiotic against mycococci and is mixed into the fodder. A preparation for calves is also under way. The drugs will be manufactured in Italy, and the synthetic step takes place in France.

A vitamin preparation for use as additive in fodder is also on the way.

A Question of Power

The question of power is central to Refaat El-Sayed. And that affects the ownership structure and corporate organization for Fermenta.

Fermenta's managing director and largest shareowner personally has total control over the group. He himself owns more than 40 percent of the capital stock. This gives him a personal wealth of about 1 billion kronor--and nearly 80 percent of all the votes. He motivates his own large possession of class A shares by the fact that he wants to avoid power struggles. With a totally dominating shareholder it is possible to prevent all "free-for-all" fights and vote-buying from other parties.

Power over and within a company should not be exercised through fighting between various ownership groups, in his opinion.

"Corporate power should be implemented by the company board of directors, not by the owners. And the company's board of directors should consist of competent people with initiative, not of representatives of various ownership groups."

A direct manifestation of Refaat El-Sayed's power philosophy was the repurchase of over 1 million shares from Electrolux last summer.

"They wanted more power over Fermenta. I couldn't agree to that."

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CSO: 3698/189

BIOTECHNOLOGY

BRIEFS

FRG PLANT GENETIC ENGINEERING--Scientists at the Max Planck Society are at this time trying to use a bacterium, which lives in the ground, for the purpose of raising crops with the help of gene engineering. Their interest is concentrated on the well-known agricultural bacterium *tumefaciens*, the virus that triggers root collar gall cancer and other tumors in many crops. The bacterium infiltrates a set of genes into the plant cells which it has struck. There it allows tumors to develop, on the one hand; on the other hand, the cell metabolism is so diverted that it produces a substance on which the bacterium feeds. This form of natural genetic manipulation is now used as a model for work at the Cologne Max Planck Institute for Breeding Research (Erwin Baur Institute). The purpose of this research effort is to use this bacterium to inject heredity information into these useful plants, such as, for example, the genes of a wild plant form which would improve the resistance. It would be conceivable in this way to cross species boundaries and to shorten the hitherto rather long-drawn-out process of breeding new varieties. The current situation in European agriculture makes it necessary increasingly to shift the goal of raising agricultural crops more toward yield stability rather than toward yield increase. Basic knowledge about disease resistance of crops and their tolerance to drought, salt, and cold must also be improved and, finally, this also involves techniques of gene transfer between plants which cannot be crossed by natural means. /Text7
/Solothurn CHEMISCHE RUNDSCHAU in German 6 Dec 85 p 17 5058

CSO: 3698/216

FACTORY AUTOMATION

FIRMS, FUNDS UP TO FALL 1985 IN FRG PROCESS TECHNOLOGY

Landsberg PRODUKTION in German 24 Oct 85 p 3

/Text/ Landsberg (br)--The German manufacturing industry in a very short time, with government support, injected at least a billion Marks into CAD/CAM as well as industrial robots and handling systems. The federal government's promotion program for investments in modern manufacturing technology mostly gave the medium-sized industrial establishments a boost. This is indicated by hitherto unpublished statistics from the project manager at the Karlsruhe Nuclear Research Center.

The German manufacturing industry vehemently responded to the aid funds made available by the federal government. In January of last year, a total of DM441 million were made available for investments in CAD/CAM (DM368 million), robots, and handling systems (DM73 million) with intermittent injections of funds. This triggered an investment surge in industry such as Dr Ingward Bey, the director of the project management establishment, would never have dared dream of. "There was a flood of applications." The program was to run for a period of 4 years, until the end of 1987. After 19 months already the people in Karlsruhe had to reject any further applicants. The money had been completely used up and the waiting line was already too long, anyway.

Industry Fully Recognized Its Opportunity

Out of the total of 2,010 applications, 1,800 involved CAD and/or CAM projects; the rest consisted of IR/HHS (industrial robots and handling systems). Of that number, 1,285 CAD/CAM applications were approved in the end. As for IR/HHS, 140 got through.

This crush clearly showed how much industry "had recognized the opportunities inherent in this technology and also acted on them," was the way Dr Bey judged the result. But those companies that could not get any support were also swept along.

Out of the total of 1,285 CAD/CAM projects, 502 received the full aid amount of DM400,000. The average subsidy came to DM286,000.

CAD alone is involved in 496 projects while CAM projects number 333 and a combination of both of these projects yields a figure of 456. CAM projects were aided primarily in the area of manufacturing control and complete order processing, in other words, PPS and BDE. This included not only a mere connection of NC to the CAD systems.

The statistics become interesting as we make a distinction according to company size (number employees): At least 24 percent of the funds for IR/HHS went to enterprises with between 11 and 50 employees. The figure is 12 percent for CAD/CAM. The situation is roughly the same in the case of IR/HHS where enterprises with between 101 and 500 employees got just about 26 percent of the allocated subsidies which came to DM73 million. But almost 43 percent of the aid fund of DM368 million were concentrated on this company size category in the CAD and CAM sector. This illustrates the great need for catching up in this technique but it also reflects the statistical average for the order of magnitude of enterprises in the FRG.

The question as to experience with CAD or CAM was answered with "none" by 73.4 percent in the case of CAD (61.2 percent in the case of CAM), with "some" by 17.3 percent (CAM 21.0 percent), and "much" by 9.3 percent (CAM 17.8 percent).

The large number of manufacturers of machine-tools among applicants should not surprise us. More than 15 percent of all funds go to this branch. This is due, on the one hand, to the strength of this industry branch; on the other hand, "this is however also a very active branch as far as new techniques are concerned," Dr Bey analyzed the result. "They went for the offer all the way." Next, we have manufacturers of measurement and testing instruments in second place with approximately 14 percent of all projects, followed closely by tool and mold enterprises.

High-output Systems Purchased

Broken down by machines or components, 59.5 percent of the manufacturers out of the total number of 1,285 projects can be matched up with machinery while 40.5 percent are in the component sector.

The manufacturing structure of the applicants is also interesting. More than 75 percent of the approved projects for CAD and/or CAM come from companies with individual and/or small-series production.

Broken down by federal states, Baden-Wuerttemberg is by far in first place with 34.5 percent of the industrial robots and handling systems projects and 30.7 percent of CAD/CAM. Bavaria comes in third place, immediately after North Rhine-Westphalia. Hesse is in fourth place. This certainly reflects the economic structure of the federal states. But Baden-Wuerttemberg just so happens to be the state of fussbudgets and tinkerers, as Dr Bey sees the situation. "They simply have a certain penchant for tackling new things." This can also be seen in the case of the robot projects where the lead becomes even clearer.

One may well be surprised by the order of magnitude of the average amounts of money spent for CAD/CAM systems. System prices between DM500,000 and DM1 million are by far in the lead with a figure of 35 percent. At least 22 percent of the companies spend between a quarter and half a million Marks. And 21 percent, at any rate, spend more than a million to take the step into the future. Altogether, that makes at least 73 percent of all CAD/CAM projects which cost more than a quarter of a million Marks. Compared to the projection structure of the enterprises--more than 75 percent individual and small-series production--we detect a certain dependence. "After all, the volume of information and data which these companies have to handle is overwhelming," Dr Bey explained. That calls for high-output systems. "You do not get far here with puny systems."

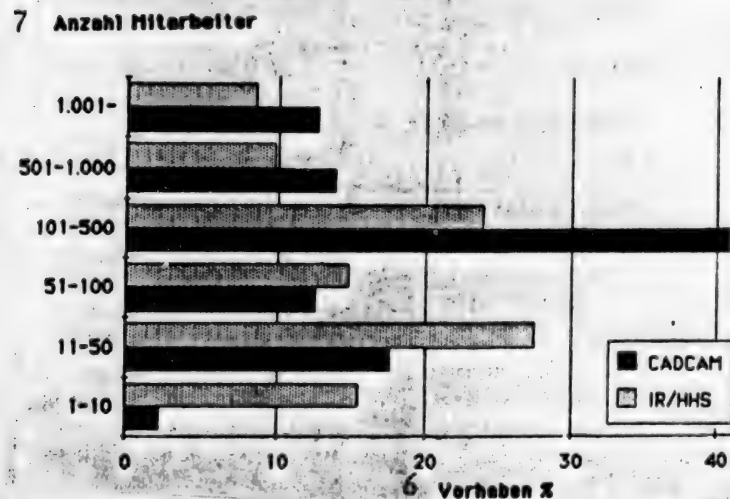
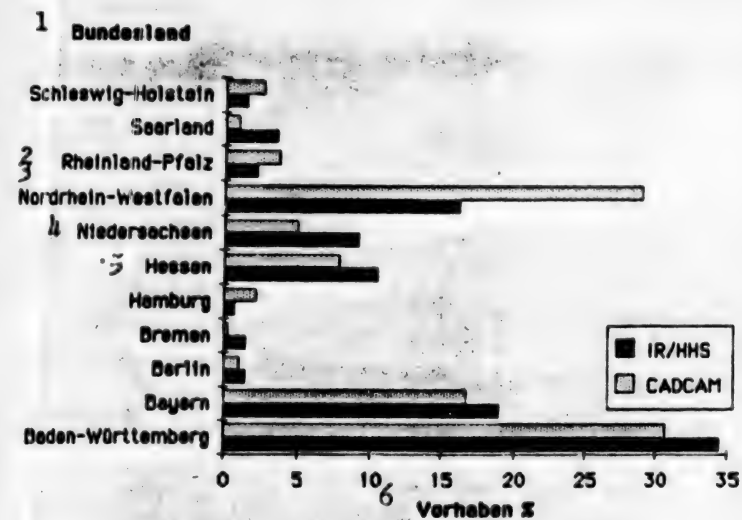
Order of magnitude of hardware and software to be procured (analysis of 1,132 projects):

less than 100 TDM	7.0%
100 to 250 TDM	14.7%
250 to 500 TDM	22.2%
500 to 1,000 TDM	35.0%
more than 1 million DM	<u>21.1%</u>
	100.0%

TDM--thousand Marks.

As for hardware purchases for CAD and/or CAM systems, the four offerors--DEC, HP, IBM, and Prime--are most favored with a total of just about 63 percent. In the case of CAD alone, 72 percent picked these computer-makers. German offerors together got at least 13 percent. Overall, 42 different offerors were listed (499 items were analyzed).

When it comes to software, of course, the Germans win. At least 37 percent of the CAD software comes from domestic offerors. In the case of CAM software, the figure goes up to 81 percent. Computervision, HP, and IBM together were picked by 10.2 percent in the case of CAM and 31.5 percent in the case of CAD (analysis of 604 entry items).



Project by federal states and company size.

The top diagram clearly illustrates the economic structure of the federal states of Baden-Wuerttemberg, Bavaria, and North Rhine-Westphalia. This is where most of the projects were carried out. The graph at the bottom clearly reveals a concentration of investment projects in industrial robots and handling systems (IR/HHS) as well as CAD/CAM in small and medium enterprises.

Key: 1--federal state; 2--Rhineland-Palatinate; 3--North Rhine-Westphalia; 4--Lower Saxony; 5--Hesse; 6--% projects; 7--number of employees.

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CSO: 3698/213

MICROELECTRONICS

FRANCE'S THOMSON, MATRA-HARRIS EXPANDING INVESTMENT

Paris L'USINE NOUVELLE in French 31 Oct 85 pp 44-45

[Article by Claude Amalric: "Semiconductors: The French Catch Up"]

[Text] The crisis in the semiconductor market is a godsend for Thomson and Matra-Harris. It is an opportunity giving them time to reach a worldwide level in view of the 1987 recovery.

This week the Matra-Harris Semiconductors (MHS) plant will start manufacturing the new generation of integrated circuits with a 1.5 micron precision: This is the best there is at the moment. In Rousset, near Aix-en-Provence, Thomson's Eurotechnique plant is finishing the installation of a production line comparable to the MHS one. They have different objectives, but the two French companies are busy trying to face in good conditions the recovery predicted for semiconductors in 1987. Both of them are taking advantage of the pause in their market to update themselves technologically.

They benefit from favorable circumstances. While world demand for semiconductors jumped by 46 percent in 1984, the current year will see a 17 percent decline from 1984, dropping from \$26 billion to \$21 billion. 1986 is expected to remain very mediocre, with a 13 percent increase over 1985.

This year's collapse of the American market, especially for memories, explains the difficulties of manufacturers like Mostek or Micron Technology, who had specialized in them and sold especially to the United States.

However, those who manufacture in France have also been hit. Texet SA, who had banked on Mosfet, has just filed a bankruptcy petition. Moreover, SGS [General Semiconductors Company] France, a subsidiary of the Italian group, has just announced a manpower surplus of almost 50 percent in its Rennes plant.

Thomson Semiconductors has been relatively safe. First of all, the European market is less centered around data processing and is withstanding the crisis better than others. "Moreover, we are supported by high-performance semiconductors, which remained nearly stable (-2 percent) in 1985. As far as MOS [Metal-Oxide Semiconductor] integrated circuits are concerned, the most promising long-term market opening, we even progressed about 20 percent,

whereas the world market dropped by 24 percent," says Jean-Philippe Dauvin, an economist in the administration of Thomson's components division. Thus, it is on a sound basis that the group is now investing in MOS.

In the agreement signed with the Japanese Oki last year, the transfer of industrial know-how for manufacturing highly-integrated MOS circuits figured prominently. The aim was to reach Japanese productivity in this field. What has become of it today?

"Oki has completely played the game: That is our good fortune. Not only did the Japanese give us the equipment, they also provided us with thousands of small details which made all the difference," says Bernard Pruniaux, director of the Eurotechnique plant. "The efforts went into the 5" line (wafers with a 12.7 cm diameter) for the MOS with a 1.5 micron precision." Of the Fr 434 million invested in Rousset in 1985, of which 92 million were in installations and 342 million in equipment, the major part went into the new plant.

Everything had to be revised: a laminar air flow in the workrooms; production machines of which only the front part is in the workroom, the back part being accessible to maintenance personnel by an external, isolated corridor. "We gain productivity by improving each of the 140 stages of a process rather than by overequipping ourselves and risking losing everything over a few badly controlled points. That is what we learned from the Japanese."

This "Japanese" line will begin functioning early in 1986 and should produce 4,000 to 5,000 wafers a month. The capacity of 20,000 wafers a month should be obtained before 1987. The old 4" line, which has been modernized, has a similar capacity. Thus, Eurotechnique will be in a position to turn out 40,000 wafers a month within a year from now.

In Grenoble, EFCIS [Company for the Study and Manufacturing of Special Integrated Circuits], who designs the microprocessors and manufactures them, aims at the same technological objective, in the future with the help of a workshop shared with LETI [Laboratory for Electronics and Data Processing Technology]. The bipolar integrated circuits division of Saint Egrevé is also being modernized.

"We have switched to the CMOS-2 micron [Complementary Metal--Oxide Semiconductor] because that is the future in all applications," says Zenyk Horbowy, director of custom-made circuits at Thomason's MOS division. "Next year we will start with the CMOS 1.25 micron, and we will develop with LETI a CMOS 0.8 micron for 1988. At the moment we are one year behind the best in production, but not in technology. There we are only slightly behind the Japanese." We have to make up for the lost time using all assets, especially in the field of CAD. EFCIS' CAD investments amount to Fr 100 million a year. With its team of 150 designers, who are "excellent architects because they come from the specialized circuits field," it is developing Sycomore, "a springboard for compilation on silicon," a key to rapid and faultless design of circuits of more than 1 million transistors. EFCIS also wants to

vigorously attack the market of custom-made circuits "particularly through strong action toward small and medium-sized industries."

Another key issue of productivity is the assembling of integrated circuits, an operation which has until now been carried out in the Far East. The pivot of the operation is the highly automated Gresy plant, near Aix-les-Bains. The investment is heavy. It will reach Fr 500 million in 1988, it will employ 600 to 700 people and turn out 100 million packages a year, or 80 percent of Thomson's manufacturing. "By assembling in France, the delivery time is cut in half. In special cases we are capable of delivering an order within 3 days," affirms the plant's director.

At MHS, whose unique Nantes setting does not have the disparity of the Thomson installations, updating seems easier. With a workforce of 800 people and a Fr 450 million turnover for 1985, the Nantes plant is fairly comparable to Eurotechnique, also because of its CMOS 1.5 micron in 5" wafers. Here, however, the technical advisers are American: Harris owns half of MHS. In addition, Intel set up a research unit called Cimatel with MHS for telecommunication circuits. To this should be added Cypress, which is specialized in high-speed static storages in CMOS. "Cypress is for us what Oki is for Thomson," comments Guy Dumas, Chief Executive Officer of Matra-Harris Semiconductors.

In spite of a lower threshold, MHS spent Fr 65 million on converting its 1.5 micron line, of the Fr 257 million that were invested in Nantes this year. "We will be profitable by the end of 1986," says Guy Dumas, who will invest Fr 160 million next year and Fr 260 million in 1987.

"How will they manage to be profitable with such an investment rate?", wonders the European president of a major American company. The state, which committed itself to supporting French integrated circuit manufacturers, will have to pursue its effort longer than expected. Alain Gomez, Chief Executive Officer of Thomson, is convinced of it; "if not, the effort will have been lost." This is all the more so since the Japanese, despite having reappraised their investment, have not stopped massive production. Their semiconductor stock will be three times the size it was just a year ago. They will have to sell it, therefore, to sell it off cheaply. This will be another challenge for Thomson and MHS to take on.

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MICROELECTRONICS

THOMSON OUTLINES STRATEGY AFTER MOSTEK ACQUISITION

Paris ELECTRONIQUE ACTUALITES in French 22 Nov 85 pp 1, 17

[Article by J.-P. Della Mussia: "Thomson Buys Back Mostek's Assets: Thomson Semiconductors Is Prepared to Achieve Sales of FF 4 Billion in the United States in 1990"]

[Excerpts] On 13 November, Thomson Semiconductors acquired most of the assets of Mostek, a U.S. company that went into bankruptcy on 26 October, for \$71 million.

Under Thomson Semiconductors' development plan, whose goal is still to achieve sales of FF 12.5 billion by 1990 (3 percent of the world market) in spite of the current crisis, this operation seems to be a handsome opportunity as it sets the stage for a drastic increase in the company's U.S. sales during the "forthcoming" recovery.

Already in 1986, Thomson Semiconductors will no longer "weigh" over \$50 million on the U.S. market as in 1986, but about \$130 million. As a result, it is no longer unrealistic to assume that the French company will achieve sales of FF 4 billion on the U.S. market in 1990 (i.e. 2 percent of the U.S. market) as projected in Thomson's plans. If synergism takes place between the French and U.S. teams, we could even expect a higher figure, as a strong recovery is bound to occur in the meantime.

2 Years Ahead of Schedule

To achieve its objective of covering 3 percent of the world semiconductors market by 1990, Thomson Semiconductors has in particular set itself the goal of covering 25 percent of the French market by that date (which will certainly not be easy) and 2 percent of the U.S. market, which after all is a modest objective. These 2 percent must be achieved starting from \$70 million in 1984 and \$50 million in 1985 (including \$14 million from the HF transistor plant in Montgomeryville) due to the U.S. recession. Considerable progress will therefore be necessary. This is why, before the Mostek operation, the company was considering setting up a 6-inch 1.2-micron MOS plant with a capacity of 20,000 wafers per month in the United States before the end of 1986. Investments of FF 750 million (in payments) had even been planned for 1986, and FF 350 million in 1987, and the decision to start was to be made late in

1985. (Reaching the full capacity of 20,000 wafers per month would have required an additional investment of FF 150-200 million to be made when at the time of full market "recovery.") These plans were compatible with Thomson Semiconductors' objective of achieving profitability by 1987.

Simultaneously, the U.S. sales network was to be expanded, as Thomson Semiconductors' marketing staff in the United States now consists of only 10 people plus 6 salesmen, and distributors that are not top level (rather 2nd or 3rd level). There again, a countercurrent investment was needed: roughly, it involved hiring 30 salesmen in 1986 to ensure that they would be truly effective in 1987.

5 Units Taken Over

Of the six Mostek diffusion units, only five, located in two buildings in Dallas, are taken over by Thomson; the Colorado Springs plant is left to UTC for its internal and research needs. Of these five plants, two, which are located in the same building, will be resold by Thomson (one of them recently suffered a fire that cost it about \$500,000, but it was insured). Of the three others, one will be "frozen" pending the recovery. That leaves two 4-inch units, one in 1.2-micron technology capable of producing 1-Mbit RAM-type CMOS circuits, and the other in 2-micron CMOS technology.

Thomson Semiconductors estimates that it would need an investment of FF 120 million over 2 years to convert the first unit to 6-inch [production] and increase its capacity to 20,000 wafers per month; for the second unit, FF 80 million over 2 years would be enough to convert it to a 5-inch unit capable of producing 20,000 wafers per month. For the time being, Thomson does not contemplate using one unit to produce bipolar integrated circuits. Without making any investment, Thomson therefore now has an available Class-10 production capacity of 30,000 4-inch CMOS/2-metallic-layer wafers, including about 10 percent in 1.2-micron technology. The Irish assembly plant is not taken over, but the assets of the Malaysian plant are. In about two months, we shall know whether Thomson will take over the Malaysian subsidiary as a whole, as it has an option to do so. It would be logical for Thomson to acquire this unit and then close it down until the Maxeville (Lorraine) assembly plant is working at full capacity. Indeed, in the short term, assembly in the Far East can continue at Thomson/Singapore.

Thomson will not take over Mostek's liabilities, but it will honor its backlog of orders. It also acquired the Mostek tradename. It takes over Mostek's U.S. marketing network, i.e. 40 salesmen who ought to be more effective than in the past since their line will be enhanced with Thomson's products. (Before bankruptcy, there were 50 salesmen.) With Thomson Semiconductors' 6 U.S. salesmen, the French company therefore now has 46 salesmen and a distribution network that includes 4 top-level distributors. In 1986, Thomson Semiconductors expects to maintain its sales at least at their present level, i.e. \$50 million from the former Thomson team, \$70 million from the Mostek team, and \$10 million as a result of the synergism achieved by the merger of the two lines, i.e. \$130 million.

Thomson is taking over 900 Mostek employees, including 40 researchers and 80 sales people in Europe, Asia and the United States. (Note that Thomson's goal to achieve \$70 million with 900 people represents a priori lucrative sales of \$77,000 per person.) Since it does not take over Mostek's liabilities, the French company is not expecting any loss during the transition stage and does not seem concerned about possible personnel shifts during the transition. In Europe, Thomson is taking over inventories and orders and is negotiating new contracts with the salesmen. In the United States, 160 people who were laid off are awaiting rehiring.

Extremely Complementary Products

All Mostek products, apart from memories, will continue to be manufactured in the United States. As for memories, research will be geared to high-speed, high-end specialized products. As far as standard RAM production is concerned, Thomson Semiconductors does not conceal its contacts with Southeast Asian companies in order to manufacture products on location, possibly under a joint venture. Moreover, development of the 1-Mbit RAM continues at Mostek (samples are already available but the chip is somewhat too large to face competition from the Japanese).

Where did Thomson Semiconductors find financing for the Mostek operation? It seems that the sale of Socapex is destined to finance two-thirds of the operation; the French State will not make any direct contribution but, in 1986, Thomson will probably receive a capital appropriation in the range of FF 200-700 million, the use of which can be imagined. At any rate, the Thomson group will provide the complement, if necessary. As is known, the Mostek purchase comes in addition to FF 1 billion in 1985 investments (compared with FF 1.5 billion projected late in 1984) and FF 1.2 billion in investments to be launched in 1986.

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MICROELECTRONICS

STOCKS, HELP FROM STATE BRING FRANCE'S BULL INTO BLACK

Paris ELECTRONIQUE ACTUALITES in French 22 Nov 85 p 26

[Article by Olivier Picon: "Bull's Commendable Financial Recovery and Its Limitations"]

[Excerpts] Moribund a few years ago, the Bull group is now getting out of the hole. It can afford to convene financial analysts and the specialized press to announce that it will break even or make a small profit in 1985 and that 1986 should definitely be a profitable year, although profit margins will still be a far cry from those of its U.S. competitors.

This concern for the "financial community" shows that Bull, like many other "nationalized" companies, probably intends to be back on the market to find funds. Currently, Bull Machines is still listed on the Stock Exchange, although the State holds over 95 percent of its stock. In turn, the company has a 97-percent controlling interest in the Bull group (the former CII-Honeywell-Bull).

Apart from stock, a large number of convertible bonds are also on the stock market; they were issued to shareholders in 1982, in exchange for their share certificates, and could be converted again into shares in the future while making it possible to exert the right to capital increases, which in recent years were reserved to the State.

From 1982 to 1984, the group lost about FF 2.5 billion. In 1982, its loss amounted to 16.5 percent of sales (FF 8 billion) and equity capital had become negative, while the debt reached FF 4.6 billion.

In 1985, the projections presented by president Jacques Stern and general manager Francis Lorentz show that sales have doubled in 3 years, reaching FF 16 billion, and that equity capital, bolstered up by the State's efforts, will reach FF 2.2 billion with only a slight increase in the debt, to FF 5.4 billion. In 1985, the company will break even and probably make a slight profit. Another yardstick of recovery: the cash flow, which showed a deficit of about FF 400 million in 1982, rose back to FF 329 million in 1983, to FF 573 million in 1984, and probably to FF 1.1 billion in 1985.

The Components of Recovery

The company considers that getting out of the red was due for three-fourths to its own merit.

Indeed, the components of recovery are as follows:

- for 11 points with respect to sales, it is due to growth, improved quality, productivity gains, and control over cost and R&D expenditures;
- for 4.4 points, from the State's purging of the balance sheet, from lower interest rates and from what is called circulating assets, i.e. inventories and accounts receivable;
- for 1.2 points, finally, from the public effort in favor of research and development.

In total, this improvement of 16.6 points made it possible to go from a negative cash flow (consisting of 9.8 percent of deficit sales before financial and research expenditures and 8.4 percent of financial expenditures from which 1.6 percent of public effort in favor of research had to be deducted) to a balanced position resulting from a 1.2-percent profit and a 2.8-percent public effort offset by 4 percent in financial expenditures.

Relations With the State

Although the State has played an important part, the Bull management points out that its relations with it have been clarified. The government now acts only as a shareholder and, as such, has invested FF 3 billion into the company. But this was done in the context of well-defined objectives and commitments over several years. There are no longer subsidies and privileged orders, as was the case in the recent past (prior to 1982). As for study credits, they are relatively smaller than those allocated by the governments of the United States and other large countries.

In 1986, Bull will complete its 1983-1986 plan. The effort made at the start of the period will bear fruit. As in previous years, growth should hold steady at 17-18 percent, hopefully progressing more abroad than in France. In 1984, foreign markets accounted for only 36.6 percent of sales.

A 1986 Profit of FF 400 million?

Barring accidents, Bull will make a significant profit, with a margin of around 1 percent at least, and maybe 2 percent. That would yield FF 200 or 400 million.

One of the risks that may impede the realization of these assumptions comes from the dollar. "We can manage between FF 8.50 and 9.50; at FF 8 or at FF 10, we have a few problems, but at FF 7 we would have major problems. The decline of the U.S. currency is a boon as far as supplies and purchases of equipment from Honeywell are concerned. It is a handicap as far as sales of computers to the U.S. partner are concerned, especially considering that

pressure from the U.S. competition would become hard to bear should the U.S. currency fall too low.

The Dollar and Trade With Honeywell

Exactly what is the balance of trade between Bull and Honeywell like? The French company buys more than it sells: FF 600 million or so vs. FF 400 million but, thanks to exports, the group's overall trade balance is positive in spite of its purchases of components in the United States.

An increase in profits is to be expected mainly from a productivity gain and from an improved financial structure. To survive in this industry, productivity must increase by 15-17 percent each year. Bull fully hopes to meet this standard. Already, the weight of salaries and social benefits over sales has declined from 43.6 percent in 1983 to 42.7 percent in 1984, and probably to 39 percent this year.

Reduction of Financial Expenses and Inventories

As far as financial expenses are concerned, they are expected to decrease as the debt is paid back: financial debts amounted to eight times the equity capital at the end of 1983, a disastrous proportion; five times at the end of 1984; and probably three times at the end of 1985, almost an acceptable proportion.

Another means of leverage would be to reduce the needs for circulating assets, i.e. the burden of inventories and accounts receivable. Inventories represented 268 days of sales in 1984 and 247 days this year. The goal is to arrive at 200 days. Accounts receivable had suffered, the company now acknowledges, from the consequences of deliveries of equipment that was sometimes of inferior quality during the dark years, hence a 1982 peak during which debts from customers amounted to 84 days of sales. That will go down to 70 days by the end of 1985, which is acceptable and therefore, contrary to inventories, leaves a small margin for progress.

All together, financial expenses declined from 6.4 percent of sales in 1983 to 4 percent this year. A study made by the Sellier brokerage reckons with 3.5 percent next year and also forecasts personnel expenditures of only 36.2 percent, leading to an estimated net profit for the year of FF 400 million for sales of FF 18.8 billion, representing a 17.5 percent increase.

Bull's financial recovery has the merit that it was achieved without sacrificing growth, which was not the case for many companies in the "Bunch." Preparation for the future was also not sacrificed. This year, FF 3 billion were absorbed by investments and R&D expenditures. In the future, after an effort is made to catch up, the investment budget should remain stable at 8 percent of sales instead of 9 percent, and research and development at 9.5 percent, i.e. a little less than 2 years ago, but as much as the competition.

A Stock Exchange Valuation of FF 5 Billion

On the Stock Exchange, priced around FF 50 for a face value of FF 30, Bull Machines are valued at about FF 5 billion. This year, the stock price varied in a range from nearly 1 to 2: FF 30.7 at the lowest and FF 58.30 at the highest. Since the beginning of the year, the price rise has exceeded 50 percent, but it took place essentially at the beginning of 1985, fell back after that and then soared with the announcement of a large order for smart cards, whose actual impact is limited due to the large size of the group.

If we anticipate a 1986 profit of FF 400 million, the stock price seems to be fully adequate since this result, still problematic, is counted at least a dozen times in Stock Exchange prices or even more if we consider that the transformation of convertible bonds into shares could increase the number of parties involved in the next few years. To warrant long-term interest, the firm should fully achieve its ambitions.

Obviously, the data-processing market is still offering the same vast growth prospects. Jacques Stern recalled that, in the United States, white-collar investment had exceeded blue-collar investment for the first time in 1984, although it amounted to only 10 percent of the latter a few years ago [as published]. Bull's strategy consists in offering global solutions by selecting market segments which the company's management believes are more promising than product segments.

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MICROELECTRONICS

SIEMENS STEPS UP EFFORT TO PRODUCE 1-MEGABIT CHIP BY 1986

Rijswijk PT AKTUEEL in Dutch 9 Oct 85 p 1

[Article by Wim Amerongen: "New Generation of Chips: Object of Fierce Competition"]

[Excerpts] Siemens is giving highest priority to the development of the one megabit dynamic memory chip. Funding amounting to DM 1.7 billion has been set aside for the development of this new generation of chips. Because the Japanese competition has accelerated its pace of research, Siemens has entered into a cooperative agreement with Toshiba. This cooperation should result in the megabit chip coming onto the market one year earlier (1986).

It is obvious that Siemens is extremely nervous. The company is going all out, but is not certain that the new technology that should make it possible to produce the one megabit memory chip will be ready in time. Philips and Siemens are each investing several billion guilders in research, and both governments are in addition making a massive contribution. Companies that are among the first to succeed in getting the chip ready for production will be able to recover investments and additionally count on massive profits. If this is not the case, then prices will have dropped in the meantime and there is very much the question of whether investments can be recovered. The cooperation with Japanese chip giant Toshiba indicates that Siemens is setting all its sails in order to stay in the race. Work is being done together with Philips on the development of the four megabit dynamic memory chip, while Philips itself is working on the one megabit static memory chip. And yet, Siemens' goal is not to come onto the market first with the new generation of memory chips.

Dr Hermann R. Franz, member of the board of directors of Siemens AG, announced last week that Siemens will be happy if it succeeds in being one of the first five companies to put the one megabit memory chip on the market. Franz, who is head of the components division, points out that the participation of a company like Siemens in the race to develop the new generation of chips is a bitter necessity. Siemens has a wide range of products.

This varies from a simple condensor to nuclear power plants. In the last fiscal year, which drew to a close at the end of last month, a sales level of some DM 40 billion was achieved, an increase of 38 percent with respect to the

previous year. Profits amounted to 2.5 percent. The sharp increase in sales is to be attributed to three nuclear power plant accounts. The importance for Siemens of earning an important place in the one megabit memory chip market is illustrated by expectations on the development of the electrotechnology and electronics market.

If Siemens is successful in a timely introduction of the new memory chip on the market, then it will be able to cash in on it. This chip will then be applied not only in computer technology, but also in automobile and consumer technology.

It is striking that Siemens is afraid only of Japanese competition. Reports in the trade press that AT&T has a megabit chip on the way are dismissed with a smile. [Gernot] Oswald [Siemens semiconductor division head]: "It is not a question of making it into the trade press first, but rather of producing the chip first." According to the publication INFO WORLD, the new AT&T component, the WE 32100, will be available on a sample basis at the beginning of next year. The Dataquest research bureau predicts that other American firms--Intel, AMD, Motorola, Mostek and Uutilec--will also have comparable chips on the market within one year. For next year, the bureau predicts sales of some \$200 million in this sector.

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MICROELECTRONICS

PHILIPS OF NETHERLANDS WANTS TO 'SPREAD ACTIVITIES' MORE

Rotterdam NRC HANDELSBLAD in Dutch 22 Nov 85 p 9

[Unattributed article: "Dekker: Philips Moving Away from Europe"]

[Text] Rotterdam, 22 Nov--Philips President Dr W. Dekker foresees for his company in the future "an approximately equal distribution" of activities among the three blocs of the United States, the Far East and Japan.

According to Dekker, Philips can only hold on to its position by flexibly going along with world developments in this way. He said this yesterday in a lecture before the Dutch association for international affairs in The Hague.

Dekker understands activities to mean the entirety of production and sales activities. Of the 1984 sales figure of 53.8 billion guilders, half was earned in Europe, 31 percent in the United States and Canada and 6 percent in Asia.

In terms of production and equipment, Philips had about 62 percent of its activities in Europe last year, with 25 percent in the United States and again approximately 6 percent in Asia. The total figure is rounded out by Latin America, Africa, Australia and New Zealand.

Dekker pointed out that the "epicenter" of world trade is shifting from the Atlantic to the Pacific Ocean. In 1984, the United States engaged in approximately the same amount of trade across the Pacific Ocean as it did across the Atlantic Ocean, something that in Dekker's opinion "could have long-term repercussion for relations between the United States and Western Europe."

Dekker mentioned the "not entirely imaginary" danger of bilateral agreements between the United States and Japan, "through which Western Europe would presumably not be better off." According to him, there are various reasons for the United States and Japan to be interested in one another. The level of trade between the two countries is already three times as large as that between the entire European Community and Japan.

According to Dekker, relations with the United States are of interest for Japan primarily in military and strategic terms. In addition, American society serves as an example for the Japanese, the United States is the most important source of technical and scientific know-how, and America is the most important import market for Japanese products and capital.

Dekker said that Europe can strengthen its position in this game by first improving its record. For this, Dekker spoke out in favor of a free European home market, European cooperation and better attunement of national industrial policy in the various countries.

Furthermore, a strengthening of the negotiation position is necessary, according to Dekker. Yesterday he again advocated defensive as well as offensive trade measures. Tariff increases should be introduced in consumer electronics for "certain important new products." As an example, Dekker mentioned the increase in the import duty on compact discs, which was raised from 9.5 to 19 percent.

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MICROELECTRONICS

PHILIPS EXECUTIVE SAYS HIGHER PROFIT NEEDED TO FINANCE R&D

Rotterdam NRC HANDELSBLAD in Dutch 27 Nov 85 p 12

[Article by Dick Wittenberg: "Philips in Race for Large Number of New Technologies: Profit Insufficient for Investments"]

[Text] Eindhoven, 27 Nov--In order to be able to continue financing the swift developments in the electronics industry, profit at Philips must go up. In addition, Philips' own capital must grow with profits, for example through issuing stock shares more regularly. Philips must also continue to enter into strategic cooperative ties.

This emerged from a talk with Dr J. Zantman, vice president of Philips and responsible for the company's financial policy.

Before the interview begins, Zantman opens with a grand gesture two doors to the black cabinet that covers nearly the entire wall of his office. There turns out to be a color television set hidden behind it. With a touch of a button on his remote control device, Zantman pulls up the stock exchange quotations on the screen. "Great," he says as he sees that Philips shares are registering at 54.40 guilders. "Now at least we know what we're talking about."

The reason for the talk was the recent announcement of cooperation between Philips and the American Dupont company. The two giants are joining hands in order to actively enter into the development, the production and the marketing of so-called optical media, such as compact discs, video discs and discs for the digital optical recorder.

As justification for the cooperation, Philips earlier put forward the fact that Dupont will provide important know-how in the area of chemistry and production processes. Moreover, Dupont has the best access to professional users in the United States, according to Philips.

And yet, this cannot disguise the fact that Philips is providing the lion's share of technological input. Moreover, it is striking that Philips is being so fraternal in sharing the compact disc, a potentially massive profit-maker, with another company. Consequently, outsiders immediately suggest that financial considerations perhaps played a role in the rallying of forces. Is

Philips perhaps incapable of coming up with the necessary one billion guilders for investment on its own? Is the Dutch multinational perhaps short of cash?

"Nonsense," is Zantman's reaction, initially with a certain amount of irritation. In a roundabout way, he stresses that other arguments were decisive. Only to finally confirm that financial reasons were also of importance.

Zantman is the first to acknowledge that profits for Philips are still too low. "If net profit were to amount to 3 to 4 percent of sales, we would be able to finance anything that we wanted to do," the vice president says. "If we achieve that level, then there is no problem whatsoever." After some hesitation he admits that Philips "does indeed have a problem" now. "For the time being, we are working on this question with diligence and cunning," Zantman adds simply.

The vice president in fact dislikes having the financial position of Philips depicted too pessimistically. He prefers to talk about the ascending line that the company has displayed in recent years. Did net profits in 1980 not amount to 0.9 percent of sales? And had this level of profits not grown to above two percent by last year? Unfortunately, the company is going to finish out 1985 at "a fraction under two percent." But this decline can be blamed primarily on the malaise in the chip industry, Zantman says. Philips is still unmistakably on track towards a gradual but structural improvement in profits.

Zantman points to the series of steps that have been taken to turn the tide. In 5 years time, the company has allocated an extra three billion guilders for restructuring. Of this amount, approximately one billion is still on hand. According to Zantman, this restructuring has meant that results in Europe this year have been able to compensate for the decline in the United States to a greater extent than expected.

The cutback in personnel and in a number of plants is now being followed by a qualitative reorganization, Zantman says. A new type of factory will be developed, bearing the world-wide responsibility for a product. Automation will continue to be implemented.

Zantman also mentions other steps to make the suffering picture and sound sector profitable again. In the area of video recorders, Philips has converted to the Japanese VHS system, and it is clear that it will in time introduce the new eight millimeter system. In addition, steps have been taken to conform the less successful activities of the independently operating North American Philips in the area of color televisions to company policy. "All of this intervention is beginning to yield fruit," Zantman says with great conviction. "In 1981 [as published]--the 100th anniversary of Philips--net profits will amount to between three and four percent of sales. That comes out to return on our own capital of 14 to 15 percent."

In order to cover increasing needs in financing, it is necessary that Philips' own capital keep pace, Zantman says. This can happen at Philips by retaining part of the profit and with the help of the revaluation reserves. Another possibility is to attract new money. Only recently, Philips made use of the

most direct method by announcing an issue of stock in the United States. The first public issue of shares by Philips in 23 years. According to Zantman, somewhat more use will be made of that possibility in the future. "Not too often, but certainly with greater regularity."

Distribution

One consideration in this is the fact that Philips wants to distribute financing across the globe. "We are clearly a European firm by origin, but we are well on the way to becoming a world company," Zantman says. "The next step is obviously to link financing with other activities. It makes a company vulnerable to be solely dependent on the European capital market. Why should we not also be present in the United States and in time in Japan?"

By 1990, Philips will invest some 20 billion guilders, 5 billion of which will go into chips alone. Even that gigantic amount is not enough in the capital-hungry electronics industry to keep up in all areas. This is why Philips is increasingly seeking its salvation in strategic cooperative ties. The joint venture between the American AT&T and Philips, which deals with public telephone services, is a telling example. The joint venture between Philips and Dupont serves as a second illustration. Financial considerations are never of primary importance in this, Zantman hastens to explain. But financial motivations do play a role.

Not Do Everything

"Electronics is such a terribly broad area. You can't do everything alone," Zantman says. This is why Philips makes a distinction between three sorts of activities. First of all, there are the parts of the company that are of marginal significance for the future of Philips as an electronics firm. These ventures are being disposed of as much as possible. Philips has already given up the Duphar chemical firm and the corrugated cardboard factories. Recently, the company found another buyer for Draka Cable, the producer of energy connections. Other less vital parts of the company are to follow.

In contrast to this, there are three areas that Philips views as the heart of the company: electronic components such as chips, home electronics and office electronics. Philips wants to share these areas with no one. According to Zantman, however, cooperation is indeed conceivable in the area of components. "As long as we remain the masters of the technology," the vice president explains.

In addition, there is the group of activities that are not essential but indeed important enough to keep in touch with. Here Zantman is thinking primarily of companies concerned with software: the music firm, the compact disc factory, the producer of audio and video tapes. Philips wants to continue to play a role in such companies, but preferably with an appropriate partner.

Which leaves only the light products division, which falls into none of the three categories. The producers of light bulbs, which is after all where Philips got started in the first place, can rest easy. "In theory, the light

division is non-essential," Zantman says. "In practice it is probably the last part of the company that we will get rid of as long as it is still turning a good profit." And at the moment the production of light bulbs is still the most profitable part of the company that is cooperating with other partners in so many "high tech" areas.

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SCIENTIFIC AND INDUSTRIAL POLICY

NEW ROBOTICS PROJECTS PROPOSED FOR EUREKA

Paris LES ECHOS in French 18 Oct 85 p 7

[Article: "Robot Firemen, High Power Laser: New Projects for Eureka"]

[Text] Industrial projects continue to flourish within the framework of the Eureka program. The latest unites five European enterprises in the development of robots intended for civilian security. The German government, which is always hesitant to release funds, has also just submitted three projects.

The Atomic Energy Commissariat, Matra, the Spanish CASA [Harvester Suppliers, Inc.], the German Dornier and the Swiss CSEM [expansion unknown], will work together on the robotics. The project announced yesterday concerns civilian security equipment, used specifically in fire fighting. In fact, it is aimed at completely replacing human labor in dangerous situations.

Moreover, the German government spokesman announced that Bonn would introduce at least three dossiers within the framework of the European research program. They will involve high power industrial lasers, toxic emissions and setting up a European research network.

However, the Germans have not specified the manner in which these projects will be financed. And for a good reason. As a matter of fact, Thursday's cabinet meeting presided over by Chancellor Kohl still did not give permission to establish a specific budgetary item for Eureka.

About a fortnight before the summit meeting in Hanover, the questions of financing are still awaiting a response. There also remain differences as to the allocation of the 'Eureka' label to the proposed projects, as well as to the structures to be put into place. In spite of everything Yves Sillard, the French coordinator, has shown some optimism. He relies on the development of a charter text for the Europe of technology. "That text is ready enough for a ministerial level agreement to take place at the Hanover summit meeting," Mr Sillard felt.

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SCIENTIFIC AND INDUSTRIAL POLICY

FRANCE'S CURIEN ON IMPLEMENTATION OF EUREKA

Paris BIOFUTUR in French Oct 85 pp 11-12

/Article: "Interview with H. Curien, Minister of Research and Technology; date and place not specified"

/Test/ BIOFUTUR: In a previous interview, in relation to Ariane, you stated that France could have carried the financial burden all by itself, but that we might be burdened by it afterwards. Can one say that Eureka's characteristic pragmatism encourages initial agreements between European manufacturers by facilitating the implementation of the actual contents of these agreements, assuming of course that they are adequate?

Curien: If--thanks to Eureka--we wish agreements to be established between European manufacturers, it is primarily to be able to realize ambitious programs with reasonable expenses and to prevent several European countries from working on the same R&D programs simultaneously and ending up with identical products competing with each other in a small market.

But this is not our only objective. You are correct to emphasize that the importance of an agreement goes beyond its initial goal. Firstly, we want to coordinate European R&D in scientifically and economically strategic sectors. At the same time, however, we are trying to arrange the European market, primarily because it is our best market for the introduction of a new product. Let us use again the case of Ariane. If we had not had the European market as the initial market for demonstrating the quality of the product, it would never have succeeded in competing with American products.

Another consequence of Eureka is that industrial cooperation will lead the Europeans to bring their standards into line--no common standards, no big European market--as well as their conceptions of industrial property. Finally, they will be led to consult with each other on how to finance scientific and technological research. I am not thinking as much of governmental financing, as I am of an appeal for savings. Let us make sure we understand each other: copying American methods is out of the question. They are useful in the United States... The Europeans will have to find new financing methods adaptable to our economic context.

BIOFUTUR: Where do you place Eureka in relation to the programs initiated by the EEC, such as the ESPRIT program?

Curien: Having been vice president of the Committee on Science and Technology of the EEC, I quite agree with the projects it has launched. Eureka and ESPRIT, if I just take this program as an example, are not competitive but complementary projects. The first difference is that Eureka wants to go as far as marketing products and systems, whereas the scientific and technological programs of the EEC are not yet competitive. ESPRIT encourages the initial phase, while Eureka's goal is the final stage. This does not mean that Eureka will only start where ESPRIT stops--we do not fear engaging in fundamental high-risk research--but it means that Eureka will continue on its way well after the stage where it has been agreed that ESPRIT should stop.

The second difference is a geographical one. Eureka's Europe is the Europe of the 18. (Footnote 1) The 12 EEC member states, the 3 Scandinavian countries, Switzerland, Turkey and Austria) Can you imagine biotechnology in Europe without countries like Switzerland or Sweden or manufacturers like Ciba-Geigy and Astra?

BIOFUTUR: Does biotechnology pose particular problems to Eureka in defining the favorable impact zone for the projects? It will take a long time to obtain the results from the very early processes. Will the large European companies (pharmaceutical, chemical, etc.) which are closer to the end of the industrial process tend to think that they can take on the projects all by themselves?

Curien: The very large projects are not part of Eureka. Some mechanisms are already in place and functioning. Eureka has nothing to do with Ariane or with Airbus. We want to use methods which are similar to the ones that helped create Ariane or Airbus, but we intend to tackle new sectors.

Let us move on to biology. In this field, the Europe of the 18 does not lack large industries. What is more, there is a network of medium-sized companies, that is, medium-sized as far as their research potential goes, even if their turnover is large when measured by the tons of cheese or hectoliters of beer they sell. It is true that certain large companies might be tempted to act unilaterally and that it is difficult to get a number of medium-sized companies to work together on one project. But we are convinced that, confronted with the enormous progress made by the Americans and Japanese, only close alliance and cooperation can allow Europeans to stand their ground. The European manufacturers can hardly remain unconvinced of this. The first examples of projects that have been selected involve electronics, data processing and robotics. However, and we want to be very clear about this, in the 15 years to come, European technology will not just concern the technology of electrons but the technology of life. We want biotechnology projects to be among the first

to be selected. You are well informed. You know that there are plenty of projects to be supported. At the moment, we have definite opportunities in the field of seeds. Biotechnology will no doubt allow us to develop new seeds which will simplify not only the lives of farmers, but also the industrial exploitation processes of agricultural products by making the soil do part of what the factory is doing now. It is said that the agricultural and food industry goes from the pitchfork to the fork. The goal is to do as much as possible before the pitchfork comes in.

It seems to us that in biology as well as elsewhere, there are two kinds of projects. There are difficult projects indeed, but they will probably allow us to obtain a product which is original and in demand within a reasonable time span, say 4 or 5 years. Cooperation will permit us to succeed much faster and benefit from a vast European market as a launching pad.

However, there are very ambitious high-risk projects in fields where we are faced with technological problems which no one can surmount at this moment, including the United States and Japan. Here we have to be especially vigilant. If our competitors are successful first, via military or civil programs, we will be a sorry sight within 10 or 15 years. Therefore, it is only by combining European research capacities that we stand a chance of keeping up with them. We feel that these two types of projects should be combined. In the beginning, this should be done sufficiently to secure the future, as well as throughout the process so that quick success can consolidate the agreements.

BIOFUTUR: How will Eureka function in practice?

Curien: It is a simple scheme. The procedures will remain simple and we hope that they will be rapid. We want the projects to come from the manufacturers. They have the initiative.

A manufacturer can tell us: "Here is a promising project. I have found--or hope to find--two or three European partners. If the public authorities are willing to help, we will get started." The manufacturers define the project, assess the amount, and agree on their respective material and intellectual participation, on the extent of the studies, on the responsibilities towards the market, on the rules for dividing intellectual property, etc. Each of the members of the consortium then turns to the authorities of his own country. If the project is accepted, the different national authorities involved meet and adjust their levels of participation. So far, there has not been an example of adjustment, but within 2 months we will present specific cases of decisions. It is important that in every country the organization which is responsible for the preliminary study of the projects and for decisionmaking be clearly defined. In France, Mrs Cresson and I have asked Y. Sillard, who is the head of IFREMER /French Research Institute for Exploitation of the Sea/ and who used to be in charge of CNES /National Center for Space Studies/, to coordinate relations between the companies, the research centers and the public authorities.

The financing of the selected projects will proceed according to the known procedures and will come from the Minister of Research, ANVAR /National Agency for the Implementation of Research/, the Minister of Industrial Development, COFIM-type loans, etc. In all the other countries there is an organization empowered to promote R&D. Thus, in every country there will be one or more "Eureka nest eggs."

We did not opt for the principle of a common piggy-bank to which every government would have to make a global contribution because this system would be more difficult to implement.

The average level of government help will be 50 percent of the cost of the project, the high-risk projects, of course, receiving more help than the ones which are less ambitious and carry less risk. This is a matter of supporting R&D and not doping industry. However, we are determined to support ambitious projects for which the overall cost today amounts to hundreds of millions of francs.

I would like to make one last point. Obviously, the commitment of governments would only be valid for the period reasonably estimated for the development of the project. Adjustments can be negotiated both in case of unforeseen difficulties and when an extension is judged desirable.

BIOFUTUR: Thank you for being precise. Could we just conclude by summing up the spirit of Eureka in one word. This word is confidence. There is confidence in pragmatism to solve the problems one by one; confidence in dynamic European industrial cooperation; confidence in the capability of a united Europe to make up lost ground in technology; confidence of the manufacturers in the determination of the public authorities; confidence of the authorities in the know-how and the ambition of the manufacturers; confidence in success.

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SCIENTIFIC AND INDUSTRIAL POLICY

CIT ALCATEL PLANS TO FLOAT SHARES FOR CAPITAL INCREASE

Paris LE MONDE in French 21 Oct 85 p 12

[Article: "CIT ALCATEL"]

[Text] Meeting on 16 October 1985 under the presidency of Mr Georges Pebereau, the board of directors of CIT ALCATEL decided to implement the whole set of operations which constitute the legal and financial result of the process of rapprochement between the ALCATEL group and the civilian communications activities which came out of the Thomson group. The realization of these operations, which are to take effect retroactive to 1 July 1985, will lead to placing under the control of the company a series of companies which, overall, should achieve a turnover on the order of 28 billion francs during the year 1985 and whose manpower exceeds 50,000 individuals.

To this effect the board has called a special general assembly of the shareholders, to be held on 31 December 1985, to make a decision on:

- the takeover of the holding company THOMSON TELECOMMUNICATIONS by CIT ALCATEL;
- the transfer to CIT ALCATEL of the "equipment" division of the TELEGRAPH AND TELEPHONE LINES [LTT] company, whereas the "cable" division of that company will be transferred at the same time to Cables of Lyon;
- the transfer to CIT ALCATEL of the "public communications" division of the THOMSON CSF [General Radio Company] TELEPHONE company, whereas the "private telephony" division of that company will at the same time be turned into a subsidiary.

At the end of these operations, LTT and THOMSON CSF TELEPHONE would be dissolved and 27,448 new shares of CIT ALCATEL would be created, to be issued on 1 January 1986.

Next, the shareholders will be called to approve a project of transfer of shares from the General Electronics Company ALCATEL ELECTRONICS and from the TEPELEC company to CIT ALCATEL by the General Electric Company and the Electro-Finance Company. This operation would be translated by the creation of 282,000 new CIT ALCATEL shares, to be issued on 1 January 1986.

If it approves these transfer projects, the assembly will have to take note of the associated increases in the capital of CIT ALCATEL.

The president noted that, for the current fiscal year, the transfers submitted to the assembly should not have a negative impact on either the company's own accounts or its consolidated accounts and that, because of the efforts achieved to improve the productivity of the subsidiaries, and while taking into account the capital expansion due to the various transfers, a progress of the consolidated result per share could be hoped for.

The shareholders will also make a decision on a proposal aimed at altering the official name of the company.

Finally, within the framework of the organization to be set up to ensure the management of the new body which will result from the planned merger, the board of directors, at the suggestion of its president, decided to appoint as vice president and general manager Mr Pierre Suard who, as administrator and general manager, has been in charge of general management since 1984, together with Mr Christian Fayard.

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SCIENTIFIC AND INDUSTRIAL POLICY

FUNDING FOR APPLIED RESEARCH UP AT FRG'S FRAUNHOFER INSTITUTE

Duesseldorf VDI NACHRICHTEN in German 25 Oct 85 p 12

/Text/ The demand for applied research in 1984 led to strong growth in the finance volume of FhG (Fraunhofer Society). With DM361 million, FhG's research expenditures increased by 13 percent compared to 1983. This figure contains DM311 million in current research expenditures and DM50 million in investments.

This growth is sustained by the contract research performance sector of FhG which in 1984 achieved a financial volume of DM251 million--corresponding to an increase of 16 percent compared to the preceding year (DM217 million). In 1980, the contract research performance area took a share of 75 percent out of the total current research expenditures of FhG (at that time DM205 million); in 1984, it already took a share of 81 percent out of the current expenditures which in the meantime had gone up more than 50 percent.

The contract research sector, which comprises the activities of 25 Fraunhofer institutes, was financed in 1984 to the extent of 63 percent (DM159 million) by earnings from research on orders for industry and government. The remaining 37 percent (DM92 million) were covered, in keeping with the FhG financing model, by "success-dependent basic financing" which the federal government and the seven countries in which the 25 Fraunhofer institutes are located supply in a ratio of 90:10.

To meet the prevailing demand for applied research in the contract research performance sector, the Fraunhofer Society in 1984 invested DM50 million for construction and initial equipment of new Fraunhofer institutes, in other words, 11 percent more than the year before (DM45 million). These investments increased the capacities in the following research sectors: Production and data processing equipment, microelectronics, environmental research, transportation equipment, labor science, and silicate research.

In 1984, DM47 million--4 percent more than the year before--were spent in the second FhG performance sector, that is, defense research, in which six Fraunhofer institutes are working. In contrast to contract research, this sector's share out of the total FhG expenditures dropped between 1980 and 1984 from 20 percent to 15 percent.

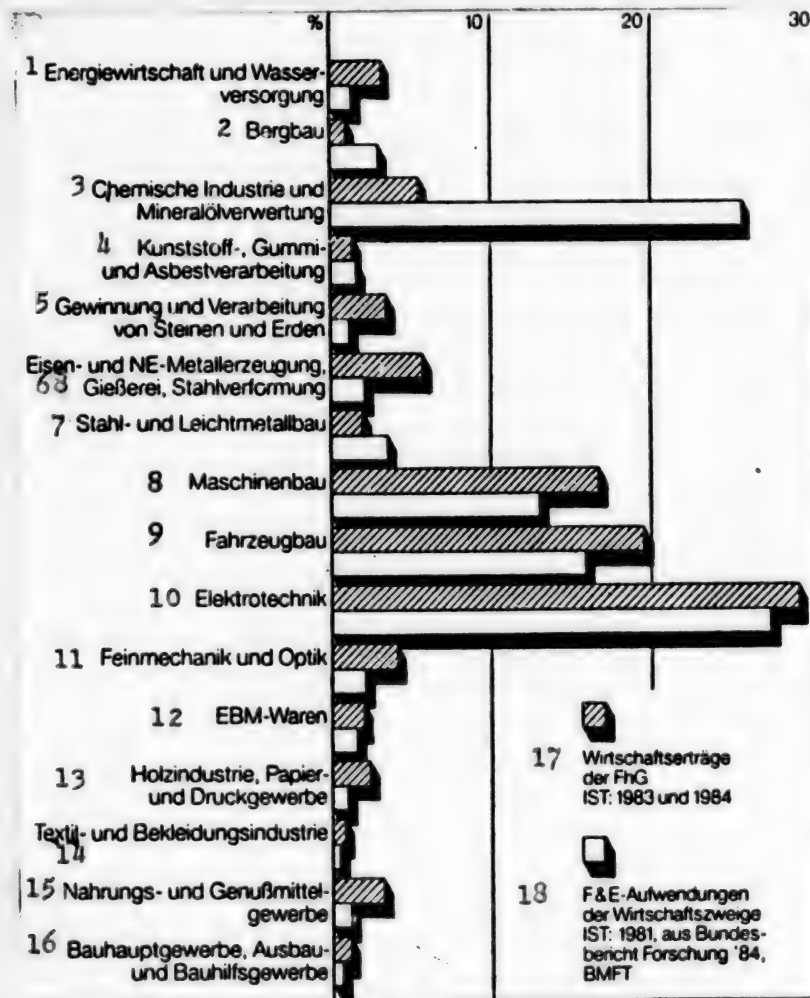
In 1984, DM13 million were spent for the third sector, in other words, the service sector, which includes the sponsoring agency for German Research in Munich (with the North German inventor center in Hanover) and the "Space" and "Construction" information center in Stuttgart; that corresponds to a share of 4 percent out of the current expenditures.

There are three main areas that determine the structure of research done by the Fraunhofer Society: Solution of acute technical problems and, therefore, technology transfer; development of future key technologies for industry, as well as the solution of government contingency problems.

The requirements of economic and technical development of the future also guide the rehabilitation institutes which were newly founded since 1980, such as the Institute for Laser Technology and the Production Technology Institute in Aachen, the Institute for Transportation Technology and Commodity Distribution in Dortmund, the Solar Energy System Institute in Freiburg, the Microelectronic Circuit and Systems Institute in Duisburg, and the Toxicology and Aerosol Research Institute in Hanover.

It is an essential objective of the Fraunhofer Society to support industry as it takes its step from invention to innovation through research and development help. The middle-sized enterprises are a special target group; their in-house capacities are often not sufficient to take this step. It is therefore only logical that FhG's economic contracts should disproportionately come from enterprises with up to 2,000 employees.

The division of labor, on the scale of the national economy, between large and medium enterprises will also in the future determine FhG's cooperation with industry. In the future it will also continue frequently to be possible to carry out risky and future-oriented new developments only in conjunction with big enterprises. Last year, the Fraunhofer Society employed 2,824 workers, including more than 1,000 scientists and 113 trainees. The number of employees rose 5 percent (136) compared to 1983. Moreover, another 653 persons worked as guest scientists, and as scientific and other aides in the FhG in 1984.



Origin of FhG Economic Earnings and R&D Expenditures of Enterprises by Industry Branches

Key: 1--energy industry and water supply; 2--mining; 3--chemical industry and mineral oil processing; 4--synthetics, rubber, and asbestos processing; 5--procurement and processing of stones and earth; 6--iron and nonferrous metal production, foundry, steel shaping; 7--steel and light-metal construction; 8--machine-building; 9--vehicle-building; 10--electrotechnology; 11--precision mechanics and optics; 12--iron, sheetmetal, and metalware; 13--lumber industry, paper and printing industry; 14--textile and clothing industry; 15--essential and nonessential industry; 16--main construction industry, finishing industry, and auxiliary construction industry; 17--FhG economic earnings; actual figures for 1983 and 1984; 18--R&D expenditures of industry branches, actual figures for 1981 from "Bundesbericht Forschung '84" /1984 Federal Research Report7, BMFT /Federal Ministry of Research and Technology7.

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SCIENTIFIC AND INDUSTRIAL POLICY

FRG PROGRAM TO PROMOTE EXCHANGE BETWEEN SCIENCE, INDUSTRY

Solothurn CHEMISCHE RUNDSCHAU in German 1 Nov 85 p 1

/Text/ A considerable shortage of raw materials and reasonably priced primary energy sources in the FRG make it necessary increasingly to use other resources in the production process. In the opinion of Federal Research Minister Riesenhuber, these resources can only be the intelligence, education level, and creativity of human beings.

The "research cooperation between industry and science" promotion measure serves the objective of strengthening cooperation between research institutions and enterprises by means of a technology transfer through "heads." Until now, scientists have temporarily been assigned from industry to research institutions in the FRG only in a few cases, primarily because of the specific costs.

Fast Practical Utilization

The assignment of young scientists from enterprises to research institutions was promoted with lump-sum amounts of DM45,000 for the first year, DM40,000 for the second year, and DM35,000 for the third year. This assistance is designed to help accomplish the transfer of new scientific discoveries in the form of industrial innovations quickly and efficiently above all in the area of key technologies.

Those participating in research cooperation derive some advantages from this. First of all, the enterprise can get a staff member trained in a highly skilled manner and at the same time specifically in a product-oriented project at considerably lower personnel costs; this involves projects in which it has a research and development interest. Second, the research institution gets another young scientist without any administrative expenditure and any labor-law problems and thus gains access to the current technology transfer needs of industry.

An initial analysis of this assistance effort after it had been under way for 2 months shows that industry and science have accepted this offer. So far, 169 applications for research cooperation support have already been approved. Out of that number, 126 covered longer-term cooperation lasting between 2 and 3 years. Cooperation of 1-2 years was agreed upon in 33 cases and cooperation extending up to 1 year was agreed in ten cases.

The scientific partners mainly come from the universities and technical colleges. As of now, 20 young scientists assignment contracts have been signed with the Fraunhofer Society, while 12 were signed with large-scale research institutions, and eight with institutions of the Max Planck Society.

Overall, we find that this indirect assistance effort, for which DM17.5 million will be made available until 1988, produces innovative impulses and that it is suitable for accelerating and spreading technology transfer.

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TECHNOLOGY TRANSFER

SWEDEN WRESTLES WITH WAYS TO STOP BEING TECH TRANSFER POINT

U.S., Ericsson Officials Meet

Stockholm SVENSKA DAGBLADET in Swedish 13 Dec 85 p 6

[Article by Lars Christiansson: "U.S. Experts Examine Computer Security in Sweden"]

[Text] An American delegation paid a very discreet visit to the Defense Ministry, the Foreign Ministry [UD], the Defense Materiel Command [FMV] and the Ericsson electronics firm for the purpose of discussing the very sensitive subject of safeguarding American high technology.

The talks were conducted on Wednesday under the leadership of Undersecretary Stephen Bryen of the U.S. Defense Department--in charge of the Pentagon section that makes sure that American high technology does not fall into Soviet hands without permission.

Bryen works directly under Assistant Secretary of Defense Richard Perle and has a great deal of influence over whether or not Sweden and Swedish firms have access to advanced technology.

Key Positions

The American delegation also included two assistant undersecretaries, Talbot Lindstrom of the Pentagon and Dale Tahtinen of the State Department, as well as some technical advisers.

Lindstrom and Tahtinen also occupy key positions when it comes to deciding how to apply U.S. high-tech export controls to Sweden.

Some technical specialists were included in the American group.

Stephen Bryen and his delegation met with Undersecretary Per Borg of the Defense Ministry and Undersecretary Carl-Johan Aberg of the UD trade section, among others. At FMV the Americans talked to Director General Carl-Olof Ternryd and Anders Farnell.

Security Requirements

Farnell is in charge of the supervisory activity that FMV carries out under an agreement with the Federation of Swedish Industries to ensure that Swedish firms live up to the security requirements the United States imposes in return for granting access to advanced computers and sensitive technology.

The visit to Ericsson concerned the problem the firm has had in getting permits to export telephone exchange systems containing American computer components to countries in the eastern bloc. That is why the technical experts came along.

The formal reason for the visit was partly an invitation from Ericsson and partly an indication by Undersecretary Per Borg that he would like Stephen Bryen to come to Sweden sometime for orientation talks concerning Sweden's need to be able to purchase American weapons technology.

High-tech matters are regarded as extremely sensitive at UD and they represent the only difficult and tangible problem in Swedish-American relations.

While Sweden is very dependent on access to American high technology, Swedish firms have been guilty of a number of violations of the American export regulations. The Data-Saab affair and the container affair are just two examples.

Washington's investigation of the export of American computer technology to the Soviet Union by the Swedish General Electric Company [ASEA] is still going on. However an American reaction to ASEA's conduct is expected within a few weeks.

The Swedish violations of the strict American regulations have led to the American authorities putting Sweden and Swedish firms through a tough examination before allowing us to buy sensitive technology.

Military Use

The bilateral problem that undoubtedly exists between Sweden and the United States with respect to technological matters is found in the civilian sector, while there is great confidence in Sweden's ability to guarantee the security of military technology.

The basic problem is that a large part of the civilian high technology that is imported to Sweden and then becomes part of Swedish advanced export products can also be used for military purposes. For strategic reasons the United States wants to guard its technological advantage and thus guarantees are required that the Soviet Union will not get hold of this knowledge by devious means.

Export Controls

In contrast to Austria and Switzerland Sweden does not have export control legislation. Countries that belong to NATO are part of the COCOM

organization which determines the technology that can be sold to communist countries on the basis of the U.S. export laws.

The Swedish government has stated that Sweden cannot allow itself to be used as a transit country for the transfer of high technology. At the same time the government made it clear that Sweden supports the principle of free trade and cannot accept an embargo policy of the kind advocated by the West. The only exception is the United Nations embargo against South Africa.

Swedish sources have said in various contexts that it could lead to misunderstandings about our neutrality policy if Sweden introduces legislation to restrict exports.

Emphasis

The fact that Stephen Bryen himself decided to visit Sweden emphasizes the seriousness with which the United States views technology transfer problems.

In talks at UD with Carl-Johan Aberg and others, it was made clear that the Americans have basic confidence in the Swedish government's resolve to live up to its stated ambition not to allow Sweden to be used as a transit nation.

At the same time they discussed cases where Swedish businessmen who use Sweden as a transit country have exported American high technology to the East bloc--without breaking any Swedish laws. The Americans made it clear that they assume this problem can be solved, but they presented no specific demands concerning the method that should be used.

During the talks at the Defense Ministry, Swedish officials said that Sweden still needs to have access to advanced American weapons technology, but that the United States sometimes makes that difficult for us. Sweden also wants to be able to fill some of its needs through purchases from other countries and by maintaining our own high-tech expertise and manufacturing sector--a desire the Americans seemed to view positively.

At FMV the visiting Americans were briefed on how the voluntary Swedish security control system covering American high technology functions in detail.

The overall Swedish assessment of the American visit is that the United States today has confidence in Swedish ambitions to make sure that no high technology is leaked through Sweden.

At the same time there is a realization that there had better not be any new major mistakes on the part of Swedish firms. That could quickly wipe out the trust that has been painstakingly built up after the Data-Saab affair and the container affair, which the Americans felt was handled well.

Government Considers Laws

Stockholm SVENSKA DAGBLADET in Swedish 17 Dec 85 p 8

[Article by Lars Christiansson]

[Text] The government is considering the introduction of an export control law. One of the purposes is to prevent Sweden from being used as a transit country for American high technology headed for communist countries. Government officials have been working on such a law for several months now.

No final decision has yet been made on how to proceed. But it has been the dominant opinion in the UD trade section for some time that Sweden should enact such a law. People in the ministry are working on different formulations. The reason is that they feel that the laws and the voluntary control activity that have been used in the past to prevent Sweden from being used as a conduit for the smuggling of American high technology to communist countries have not been foolproof.

The new problem confronting Sweden is illustrated by the following events.

Embargo Violations

A while back it was discovered that a Swedish businessman was importing sensitive American technology from West Germany and exporting it to East Germany. He had done the same thing some 20 times before. From a Swedish point of view these transactions were quite legal. At the same time it was obvious that from an American point of view they violated the U.S. high-technology embargo.

The Swedish government has no clear picture of the extent to which this opportunity to circumvent the American embargo on technology is being utilized. But people in the UD trade section fear that the "loopholes" in the Swedish law will be increasingly utilized. One of the reasons for this concern is that both Austria and Switzerland have closed their borders via export control laws, which has probably resulted in technology smugglers concentrating even more on utilizing the Swedish situation.

Introducing an export control law is a very sensitive matter for Sweden, which has long rejected any idea of this kind with reference to the principle of free trade and to the fact that such a law would be hard to explain on the basis of neutrality policy aspects.

The United States has made it clear through diplomatic contacts and in other ways that each new attempt to transport sensitive technology through Sweden to eastern nations would be scrutinized closely. Sweden's handling of each "smuggling attempt" is regarded as a test of whether we are living up to our stated intention to stop all attempts to use our country as a transit nation.

Foreign Trade Minister Mats Hellstrom and other government representatives have stated time after time that this is Sweden's intention.

Showed Sweden's Determination

Sweden's handling of the so-called container affair helped strengthen the confidence of the American government with respect to Sweden's determination to make sure that no high technology leaks to the East through Sweden.

For some time a working group--with representatives from the UD trade section, the Defense Ministry and the Industrial Affairs Ministry--has been studying intensively the question of how Sweden should move to ensure that we have access to the vital American high technology without violating fundamental Swedish trade policy principles.

Great Confidence

There has not been any political pressure on Sweden from the United States to enact special export control legislation. On 24 September of this year U.S. Assistant Secretary of Defense Richard Perle said that the United States has great confidence in the way in which the Swedish government and Swedish businesses handle technology control on the basis of voluntary measures.

The basic American attitude appears clearly from a talk SVENSKA DAGBLADET had some time ago in Washington with the powerful Pentagon undersecretary, Stephen Bryen. He is in charge of the Pentagon section that has great influence over the application of the regulations of the American high technology embargo against communist countries.

On that occasion SVENSKA DAGBLADET asked Bryen if the United States wanted Sweden to pass a law in order to improve guarantees that American high technology would not be secretly re-exported.

"That is not an important question when we decide whether or not to approve export shipments. The important thing is that violations are penalized and abuses are halted.

"If the present system turns out to be inadequate we will make strong demands for effective legislation. But we have had no reason to do this so far," said Bryen, who thought the Swedish system was functioning in a satisfactory way.

There does not seem to have been any change in the American assessment, judging from the talks Stephen Bryen had with representatives of the Swedish government when he visited Stockholm last week.

But the situation is regarded as very sensitive by UD, because the least mistake can lead to new problems for Swedish businesses with respect to gaining access to the sensitive technology.

Against Tradition

The realization that it is completely legal to "smuggle" American high technology covered by the embargo through Sweden has now led to concrete efforts

to draft a law. This is not without problems. A law that directly refers to penalizing those who reship American high technology through Sweden is incompatible with Swedish legal tradition and Sweden's policy of nonalignment.

The work being done by the UD trade section is aimed at trying to find a general neutral formula that will make it possible to exercise control and to intervene when Sweden is used as a conduit for the re-export of advanced technology. The work has not yet led to an entirely acceptable solution.

Benefits of Law

The advantage of a Swedish export control law would be that Swedish businesses would find it easier to import and re-export advanced technology from the United States. After a trial by the U.S. government Sweden would also be able to obtain terms similar to those enjoyed by businesses in the countries that belong to COCOM. The organization, which is made up of NATO countries and a few other nations, decides which technology can be sold to the eastern nations on the basis of the U.S. export laws.

Sweden 'Exposed'

An export control law does not conflict in any way with Sweden's policy of nonalignment. Sweden has had such laws in the past. But it could create "optical" problems for Sweden's neutrality policy, according to several Swedish foreign policy experts. By this they mean that Sweden will expose itself to political attacks by the Soviet Union which often charges in its anti-Swedish propaganda that Sweden's technological dependence on the United States is incompatible with Sweden's neutrality policy.

But other observers feel that the Soviet Union would have no illusions about something like this, since an export control law would not involve any real change in Sweden's technological dependence. In addition it is obvious that Sweden is striving to reduce its technological dependence on the United States. This can be seen for example in Sweden's participation in the French-initiated Eureka project.

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